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MEMORANDUM

TO: Regional Directors, Director – Air Permits, Director – Air Compliance, Director – Data Analysis and Planning, Director – Regulatory Affairs, Air Permit Managers, Air Compliance Managers

CC: Richard F. Weeks, Chief Deputy Director
James J. Golden, Deputy Director for Program Development

FROM: Michael G. Dowd – Director, Air Division

SUBJECT: APG-354: Article 6 – Uncontrolled Emissions Calculation

DATE: January 5, 2009 (as amended March 17, 2009)

Purpose:
This policy provides interim guidance to air permitting staff concerning permit applicability reviews that are to be conducted following the change to the applicability test for minor new source review (NSR), promulgated in October 2008, which changes the actual-to-potential emissions test to an uncontrolled-to-uncontrolled emission rate test. The new applicability test is effective December 31, 2008. This guidance is not intended to cover every possible situation but should be applicable in most scenarios. Check with the regional air permit manager and/or the central office staff if a deviation from the guidance is considered to be necessary.

Background:
Chapter 282, 2008 Acts of the Assembly which amended and reenacted §10.1-1322.4 of the Code of Virginia, required the board to adopt regulations providing that when determining whether a physical or operational change at an existing stationary source requires a permit or permit amendment under the minor new source review regulations, changes in emissions shall be calculated as the difference between the source's pre-change and post-change annual uncontrolled emission rates. The revised regulation includes a new definition for "uncontrolled emission rate" that was taken verbatim from the underlying legislation.

Applicability:
This guidance only applies to criteria pollutants and minor NSR permitting after December 31, 2008. The procedures for calculating toxics and major NSR permitting applicability have not changed. If a source has submitted a complete application before December 31, 2008, then the source is subject to the old applicability rule, i.e. past actual-to-potential emissions test.

Definitions:
As stated in 9 VAC 5-80-1110 C:

1. “Actual Emissions” – This definition no longer exists.

2. "Net emissions increase" means the amount by which the sum of the following exceeds zero: (i) any increase in ~~actual emissions~~ the uncontrolled emission rate from a particular physical change or change in the method of operation at a stationary source; and (ii) any other increases and decreases in ~~actual emissions~~ the uncontrolled emission rate at the source that are concurrent with the particular change and are otherwise creditable. An increase or decrease in ~~actual emissions~~ the uncontrolled emission rate is concurrent with the increase from the particular change only if it is directly resultant from the particular change. An increase or decrease in ~~actual emissions~~ the uncontrolled emission rate is not creditable if the board has relied on it in issuing a permit for the source under the new source review program and that permit is in effect when the increase in ~~actual emissions~~ the uncontrolled emission rate from the particular change occurs. Creditable increases and decreases shall be federally enforceable or enforceable as a practical matter.

3. “Potential to emit (PTE)” means the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment, and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design only if the limitation or its effect on emissions is state and federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.

4. “Uncontrolled Emission Rate” means the emission rate from an emissions unit when operating at maximum capacity without air pollution control equipment. Air pollution control equipment includes control equipment that is not vital to its operation, except that its use enables the owner to conform to applicable air pollution control laws and regulations. Annual uncontrolled emissions shall be based on the maximum annual rated capacity (based on 8,760 hours of operation per year) of the emissions unit, unless the emissions unit or stationary source is subject to state and federally enforceable permit conditions that limit the annual hours of operation. Enforceable permit conditions on the type or amount of material combusted, stored, or processed may be used in determining the uncontrolled emission rate of an emissions unit or stationary source. The uncontrolled emission rate of a stationary source is the sum of the uncontrolled emission rates of the individual emissions units. Secondary emissions do not count in determining the uncontrolled emission rate of a stationary source.

Implementation:
Uncontrolled emissions are based on a source operating at its maximum design capacity without taking into account air pollution controls, but considering enforceable permit conditions that limit the hours of operation, production, or process rate on an annual basis. Annual emissions are based on 8,760 hours of operation when not limited by permit conditions. Different scenarios arise as stated below:

1. New or Relocated Emissions Unit (same as previous applicability test):

a. At an existing source:

- Hourly emissions: The emissions resulting from operating at the maximum design capacity without air pollution controls.
- Annual emissions: The emissions based on 8,760 hours of operation without air pollution controls.
- Permit Applicability: Compare the unit size and type to the exemption rates in 9 VAC 5-80-1320 B. If the unit is not exempt based on size and type, calculate the net emissions increase and compare it to 9 VAC 5-80-1320 D (modification exemption levels). If exceeded, the unit needs a permit. If not exceeded, the unit is exempt for criteria pollutants.

b. At a new or relocated source (Greenfield source):

- Hourly emissions: The emissions resulting from operating at the maximum design capacity without air pollution controls.
- Annual emissions: The emissions based on 8,760 hours of operation without air pollution controls.
- Permit Applicability: Compare the unit size and type to the exemption rates in 9 VAC 5-80-1320 B. If the unit is not exempt based on size and type, calculate the uncontrolled emission rate and compare it to 9 VAC 5-80-1320 C (new source exemption levels). If exceeded, the unit needs a permit. If not exceeded, the unit is exempt for criteria pollutants.

2. Modified or Reconstructed Emissions Unit:

a. At a permitted source:
Uncontrolled emission calculations for currently permitted emissions units must be based on the permit rather than 8760 hours of operation per year because the definition of uncontrolled emissions includes enforceable permit conditions. Modifications to these units often involve an increase in the permitted throughput or hours of operation.

- Hourly emissions: The emissions resulting from operating at the maximum design capacity without air pollution controls.
- Annual emissions: The emissions based on an enforceable throughput limit permit condition without air pollution controls.
- Permit Applicability: Take the new uncontrolled annual emissions (post uncontrolled modification emissions) and subtract the emissions resulting from currently permitted limits (throughput, hours) without air pollution controls. Compare the difference in annual emissions to the exemption rates in 9 VAC 5-80-1320 D. If exceeded, the source needs a permit modification. If not exceeded, changes should be incorporated into the permit using the significant amendment procedures.

b. At an un-permitted/existing source:
Modifications to these units usually involve an increase in the maximum capacity of the units.

- Hourly emissions: The emissions resulting from operating at the maximum design capacity without air pollution controls.
- Annual emissions: The emissions based on 8,760 hours of operation without air pollution controls.
- Permit Applicability: Take the new uncontrolled annual emissions and subtract the pre uncontrolled modification emissions (operating the current unit at 8760 hours per year without air pollution controls). Compare the difference in annual emissions to the exemption rates in 9 VAC 5-80-1320 D. If exceeded, a permit is required.

BACT Applicability:

BACT applicability is the same as permit applicability, i.e. NUE – CUE and no proposed throughput limits can be used. If permit applicability is triggered for a pollutant, then BACT applicability is triggered for that same pollutant.

Where: NUE = New Uncontrolled Emissions
CUE = Current Uncontrolled Emissions

Debottlenecking:

For units that have been evaluated without consideration of operational constraints, there will be no increase in uncontrolled emissions. Where operational restrictions were previously considered in determining "capacity", an increase in uncontrolled emissions may be considered.

Major Modification:

A major modification is:

- If at a minor source = 100 ton/yr permitted increase
- If at a major source over 100 tons/yr (state major) = PSD significance levels permitted increase (9 VAC 5-80-1615 under "Significant")
- Calculation = Proposed limit – Previous PTE (can include controls)

Source Category Guidance:

1. Uncontrolled Sulfur Content of Fuels: Determine sulfur content based on the following guidelines:
   - 0.5% sulfur for No. 1 and 2 distillate oil based on the ASTM definition,
   - Rule 4-8 (for your region) for No. 4 or higher residual oil and coal, and
   - AP-42 emission factors for bio-oils, natural gas, and wood waste.

2. Uncontrolled Emission Factors: When calculating the uncontrolled emission rate of the unit, air permitting staff shall follow the guidance below:
   - If representative stack test data is available from the unit or from a similar unit (if the unit is not controlled), then the permitting staff may use this emission factor at 8760 hours/year.
   - If stack test data is not available, use the worst case emission factor at 8760 hours/year.
   - Where the emission factor contains a variable, use the worst case variable.
   - If no emission factor is available or you are not sure of the worst case variable and there is an allowable emission rate in Chapter 40 (Existing Source Rules), use the rule.

3. Uncontrolled Emissions Rate From a Spray Booth:
    - For a new spray booth = Gun capacity at 8760 hrs/yr at the worst case coating proposed (no cleaning solvents at 100% VOC)
    - Previously permitted spray booth = For units that have been evaluated without consideration of operational constraints, there will be no increase in uncontrolled emissions. Where operational restrictions were previously considered in determining "capacity", an increase in uncontrolled emissions may be considered.

Examples:

1. Example #1

Question: A facility has sent in an application for a process unit to increase the maximum rated capacity from 10 tons feed input/hr to 15 tons feed input/hr. The emission factor used in this process unit is 2 lbs PM-10/ton feed input. The unit does not have a permit. Does the process need a minor NSR permit?

Answer: The current uncontrolled emissions are based on 10 tons feed input/hr and operating at 8760 hours per year. The new uncontrolled emissions are based on 15 tons feed input/hr and operating at 8760 hours per year. Since this unit is not permitted, it does not have a current throughput limit. The difference between the two is compared below:

Current uncontrolled emissions:
Hourly Emissions = (10 tons feed input/hr) * (2 lbs PM-10/ton feed input) = 20 lbs PM-10/hr
Annual Emissions = (20 lbs PM-10/hr) * (8760 hrs/yr) / (2000 lbs/ton) = 87.6 tons PM-10/yr

New uncontrolled annual emissions:
Hourly Emissions = (15 tons feed input/hr) * (2 lbs PM-10/ton feed input) = 30 lbs PM-10/hr
Annual Emissions = (30 lbs PM-10/hr) * (8760 hrs/yr) / (2000 lbs/ton) = 131.4 tons PM-10/yr

NEI Calculations:
(131.4 tons PM-10/yr) – (87.6 tons PM-10/yr) = **43.8 tons PM-10/yr**
New uncontrolled *Current uncontrolled*

The modification exemption rate for PM-10 is 10 tons/yr. Since the increase is above the modification exemption rate, this will be a modification subject to permitting.

Since BACT applicability is the same as permit applicability, the calculations for BACT applicability would be the same as above. Therefore, BACT would be triggered for PM-10.

2. Example #2

Question: A facility has sent in an application to request an increase in throughput for a 12 MMBtu/hr boiler currently limited to 300,000 gallons distillate fuel oil/yr to 400,000 gallons distillate fuel oil/yr. The unit is permitted. What kind of permit action is this?

Answer: The current uncontrolled emissions are based on 300,000 gallons distillate fuel oil/yr. The new uncontrolled emissions are based on 8760 hrs/yr. Since the boiler emits all criteria pollutants, all criteria pollutants need to be looked at for NEI calculations. For this example, we will

use the emission factors from AP-42 Tables 1.3-1, 3, and 7 dated 9/98 *Emission Factors for Fuel Oil Combustion*. The difference between the two is compared below:

Current uncontrolled emissions:
Sulfur content of the distillate oil = 0.5%
Annual Emissions = (300,000 gals/yr) * (20 lbs NO_X/1000 gal) / (2000 lbs/ton) = 3.0 tons NO_X/yr

Pollutant	Emission Factor (lbs/1000 gal)	Annual Emissions (tons/yr)
PM	2	0.30
PM-10	1.08	0.16
SO_2	142*0.5	10.65
CO	5	0.75
VOC	0.34	0.051
NO_X	20	3.0

New uncontrolled annual emissions:
Heat content for distillate fuel oil = 140,000 Btu/gal
Sulfur content of the distillate fuel oil = 0.5%
Fuel Rating = (12.0 MMBtu/hr) * (10^6 Btu/MMBtu) / (140,000 Btu/gal) / (1,000 gal/Mgal)
= 0.086 Mgal/hr
Hourly Emissions = (0.086 Mgal/hr) * (20 lbs NO_X/Mgal) = 1.72 lbs NO_X/hr
Annual Emissions = (1.72 lbs NO_X/hr) * (8,760 hrs/yr) / (2000 lbs/ton) = 7.53 tons NO_X/yr

Pollutant	Emission Factor (lbs/1000 gal)	Annual Emissions (tons/yr)
PM	2	0.75
PM-10	1.08	0.41
SO_2	142*0.5	26.74
CO	5	1.88
VOC	0.34	0.13
NO_X	20	7.53

NEI Calculations:

Pollutant	New Uncontrolled	Current Uncontrolled	NEI Calculations	Exemption Modification Levels
PM	+ 0.75	- 0.30	+ 0.45	15
PM-10	+ 0.41	- 0.16	+ 0.25	10
SO_2	+ 26.74	- 10.65	+ 16.09	10
CO	+ 1.88	- 0.75	+ 1.13	100
VOC	+ 0.13	- 0.051	+ 0.079	10
NO_X	+ 7.53	- 3.0	+ 4.53	10

As shown above, SO_2 exceeded its respective exemption modification level. Therefore, this will be a modification subject to permitting.

Since BACT applicability is the same as permit applicability, the calculations for BACT applicability would be the same as above. Therefore, BACT would be triggered for SO_2.

3. Example #3

Question: A facility in Roanoke has sent in an application requesting a change in fuel for their two Kewanee 13.7 MMBtu/hr distillate oil-fired boilers. The facility is requesting approval to change the permitted fuel from No. 2 distillate oil with a sulfur content of 0.5% to No. 4 residual oil with a sulfur content of 0.5%. The source requested that the current annual fuel throughput of 300,000 gallons for each boiler not be changed for the boilers. The boilers were already subject to NSPS, Subpart Dc and all NSPS requirements are in the permit. What kind of permit action would this be?

Answer:
(1) The switch in fuels is not an exception within the definition of modification because the boilers were "previously limited by permit conditions," allowing them to only burn No. 2 distillate oil.

(2) Each boiler would not be exempt under 9 VAC 5-80-1320 B.1.b since each is over the 10 MMBtu/hr limit.

(3) Since the units are not specifically exempt or automatically subject to permitting, a NEI calculation must be performed. The current uncontrolled emissions for the units are based on 300,000 gallons No. 2 distillate fuel oil/yr (not equal to zero since it is the emission unit that is being modified, not the fuel). The new uncontrolled emissions for the units will be based on 8,760 hrs/yr since there is currently no throughput limit for No. 4 residual oil in the permit. Since the boiler emits all criteria pollutants, all criteria pollutants need to be looked at for NEI calculations. For this example, we will use the emission factors from AP-42 Tables 1.3-1, 3, 5, and 6 dated 9/98 *Emission Factors for Fuel Oil Combustion*. The difference between the two is compared below:

<u>Current uncontrolled emissions:</u>
It is the emission unit (boiler) that is being modified with the addition of the new/replacement fuel. So, the uncontrolled emissions prior to the change would be based upon the permitted throughput of #2 fuel oil.
Sulfur content of the No. 2 distillate oil (permitted limit) = 0.5%
Annual Emissions = (300,000 gals/yr) * (20 lbs NO_X/1000 gal) / (2000 lbs/ton) = 3.0 tons NO_X/yr

Pollutant	Emission Factor (lbs/1000 gal)	Annual Emissions (tons/yr)	2 Boilers Annual Emissions (tons/yr)
PM	2	0.30	0.60
PM-10	1.00	0.15	0.30
SO_2	142*0.5	10.65	21.30
CO	5	0.75	1.50
VOC	0.2	0.03	0.06
NO_X	20	3.0	6.0

New uncontrolled annual emissions:
Heat Content for No. 4 residual oil = 150,000 Btu/gal
A = 0.84 (from AP-42, Table 1.3-5)
Sulfur content of the No. 4 residual oil (as stated in Chapter 40, Rule 4-8) = S = 2.64*K
Where S = Allowable emission of sulfur dioxide expressed in pounds per hour (lbs/hr)
K = Heat input at total capacity expressed in Btu x 10^6 per hour (MMBtu/hr)
S = (2.64) * (13.7 MMBtu/hr) * (8,760 hrs/yr) / (2,000 lbs/ton) = 158.42 tons/yr

Fuel Rating = (13.7 MMBtu/hr) * (10^6 Btu/MMBtu) / (150,000 Btu/gal) / (1,000 gal/Mgal)
= 0.0913 Mgal/hr
Hourly Emissions = (0.0913 Mgal/hr) * (20 lbs NO_X/Mgal) = 1.83 lbs NO_X/hr
Annual Emissions = (1.83 lbs NO_X/hr) * (8,760 hrs/yr) / (2000 lbs/ton) = 8.02 tons NO_X/yr

Pollutant	Emission Factor (lbs/Mgal)	Annual Emissions (tons/yr)	2 Boilers Annual Emissions (tons/yr)
PM	7	2.80	5.60
PM-10	7.17*0.84	2.41	4.82
SO_2	2.64*K	158.42	316.83
CO	5	2.0	4.0
VOC	0.2	0.080	0.16
NO_X	20	8.02	16.04

NEI Calculations:

Pollutant	New Uncontrolled	Current Uncontrolled	NEI Calculations	Exemption Modification Levels
PM	+ 5.60	- 0.60	+ 5.0	15
PM-10	+ 4.82	- 0.30	+ 4.5	10
SO_2	+ 316.83	- 21.30	+ 295.5	10
CO	+ 4.0	- 1.50	+ 2.5	100
VOC	+ 0.16	- 0.06	+ 0.1	10
NO_X	+ 16.04	- 6.0	+ 10.04	10

As shown above, SO_2 and NO_X exceeded their respective exemption modification levels. Therefore, this will be a modification subject to permitting.

Since BACT applicability is the same as permit applicability, the calculations for BACT applicability would be the same as above. Therefore, BACT would be triggered for SO_2 and NO_X.

Questions or comments on this guidance should be directed to the Office of Air Permit Programs.